

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

FOREST TRAILS AND LANDINGS

(Acre)

CODE 655

DEFINITION

A route, travel way, or cleared area within a forest.

Slash, debris, and vegetative material left on site after construction will not present an unacceptable fire or pest hazard or interfere with the intended purpose.

PURPOSE

- Provide access to forest stands for management.
- Provide access for removal and collection of forest products.
- Provide access to forested areas for recreation.
- Minimize on-site and off-site damage to resources during periods of access.

Water bars, rolling dips, timber bridges, rock plunge pools, and other drainage measures for trails shall be of sufficient size, intervals, and gradient for adequate drainage and erosion control.

Trails and landings, where appropriate, shall be sufficiently revegetated to control erosion.

Noxious plants will not be used for revegetation.

Comply with applicable federal, state, and local laws and regulations during the installation, operation, and maintenance of this practice.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on forested areas.

This practice does not include permanent logging and access roads. Permanent logging and access roads generally receive continual use and should be designed according to the standard for Access Road (Code 560).

CRITERIA

General Criteria Applicable to All Purposes

Trails and landings will be of a size, gradient, number, and location to economically and efficiently accomplish the intended purpose by expected users. They shall be configured to minimize adverse on-site and off-site impacts such as accelerated erosion, riparian zone degradation, stream channel and streambank damage, hydrology modification, other water resource damage, aesthetics or unacceptable damage to advance regeneration, residual growing stock, wildlife habitat, fragmentation, or restrict wildlife movement.

Timing and use of equipment will be commensurate with site and soil conditions to maintain site productivity and minimize soil erosion, displacement, and compaction.

Forest trails are unpaved, single-land paths or narrow roads used to move forest products to an access point, manage, and provide access for recreation. They may be steeper and narrower than an access road, and traffic may be limited or eliminated after completion of logging.

Forest skid trails are forest trails that usually are not graded and need only a minimum amount of clearing. They are used to transport logs from the stump to the main forest trail.

LOCATION

Extent of the trail system will be constrained by topography, boundary lines, and economic limits on skidding and hauling logs. The following guidelines will be used to locate trails:

1. Locate as high above and far away from streams as possible.
2. Fit to the topography by following the natural contours and keeping primary trail grades below 10 percent slope.
3. Minimize the number of stream crossings and choose stable crossing sites.
4. To the extent possible, avoid wet areas, steep slopes, and unstable soils.

The following guidelines will be used to locate landings:

1. Landings should be as small as possible and still accommodate logging equipment.
2. Locate as far as practical from nearest stream. At a minimum, the landing should be no closer than 50 feet of the nearest Streamside Management Zone (SMZ).
3. Landing site should have good drainage, but with slopes less than 5 percent.

The following guidelines will be used in locating skid trails:

1. Locate skid trails to avoid damage to residual trees, minimize erosion, and provide an economical route.
2. Gradients should not exceed 15 percent. Sections of the trail may be up to 20 percent, if the distance does not exceed 300 feet.
3. Do not construct skid trails straight up and down the slope.
4. Avoid joining several skid trails at one point, as the disturbed area will continue to expand at the trail intersection.
5. To control erosion and enhance wildlife habitat, revegetate skid trails after logging operation is complete.

DRAINAGE

Water bars, broad-based dips, and other drainage measures will be utilized where needed to control water movement and discourage gully development. These measures will be of sufficient size, interval, and gradient to safely dispose of surface water flow.

Broad-based dips are shallow, wide diversions, usually used on trails having a gradient of 10 percent or less. A broad-based dip is constructed by building a 3 percent reverse grade into the existing bed. The bottom of the dip will be out sloped 2 to 3 percent maximum and extend the full width of the trail or roadway. For maximum self-cleaning, angle the cross drain 10-25 degrees down slope. The dip and reverse grade section may require bedding with 3 inches of crushed stone in some soils for stability and to prevent unacceptable rutting.

Broad-base dips should be spaced according to the following formula and table.

Spacing in Feet = $400/\text{Slope \%} + 100$	
Road Grade (percent)	Approximate Distance Needed Between Dips (feet)
1	500
2	300
3	233
4	200
5	180
6	167
7	157
8	150
9	144
10	140

Water bars can be used on trails up to 25 percent grade and should be installed at an angle of 30 degrees or less down slope depending on the grade of the trail. Steeper trail grades require less down slope angle. Water bars should be constructed 8-12 inches deep and out sloped 3 percent to assure good water flow and self-cleaning action. The outflow end of the water bar should be open to keep water from accumulating and be protected by a buffer

or filter zone of undisturbed forest floor to filter out sediment and prevent erosion.

Water bars should be spaced according to the following table as outlet conditions allow:

Road Grade (percent)	Approximate Distance Between Water Breaks (feet)
1	400
2	245
5	125
10	80
15	60
20	50
25	40

Culverts are effective structures used to carry water in drains, small streams, and side ditches to the other side of the road. Install culverts as needed at the time of construction to channel water across roads and trails. Pipe culverts are the most commonly used. Culvert grade should be at least 2 percent more than ditch grade and skewed 30 degrees. To avoid soil erosion, reduce the outlet speed of the culvert water by armoring the outlet with a bed of energy dissipaters of rocks or debris. Proper sizing of culverts is essential to providing adequate drainage. Pipe size should be determined using procedures in the NRCS [Engineering Field Handbook](#). Pipes for stream crossings should be long enough to provide a top width for wide logging equipment or trucks and still have a minimum 1.5 to 1 side slope on each side of the fill.

A permit may be required from the U.S. Army Corps of Engineers any time fill material is placed in a stream.

TRAIL DIMENSIONS

Width of trails should be sufficient to accommodate the equipment being used (normally 10 feet). Width will be increased as necessary at curves and turnouts.

For best surface drainage and where conditions will allow, out slope the entire width of the trail. As a safety precaution on sharp turns and road gradients of 11 percent or more and on clay or slippery soils, trails should be insloped.

Ditch turnouts shall be constructed so that storm flow will be dispersed and will not cut channels across streamside management zones.

Crushed stone or other protective ground cover should be added to the last 100 feet of a harvest trails before it intersects a highway to prevent mud from entering the highway and causing driving hazards.

CONSIDERATIONS

Assure safe ingress and egress to site.

Locate landings and trails to preserve aesthetic qualities.

Landings and trails may be closed for erosion control, safety and liability, and reduced maintenance costs.

Landings and trails may be used for wildlife food and cover plantings.

Landings and trails may be utilized as firebreaks.

Consider cultural resources and environmental concerns such as threatened and endangered species of plants and animals, natural areas, and wetlands.

PLANS AND SPECIFICATIONS

Specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation plan or other acceptable documentation.

Specifications for revegetation of landings and trails should include species, timing, and method of application.

OPERATION AND MAINTENANCE

Periodic inspections of landings and trails will be conducted and, where necessary, repairs will be made.

Landings and trails utilized as firebreaks will be properly maintained to accomplish this purpose.

Landings and trails may be closed for erosion control, safety and liability, and reduced maintenance costs.

Landings and trails no longer needed can be “put to bed” by removing high maintenance structures, such as culverts and bridges, and can be restored to a vegetative cover by planting and seeding.

REFERENCES

NRCS National Forestry Handbook. February 2001.

NRCS National Forestry Manual. September 1998.

Society of American Foresters. Forestry Handbook, Second Edition. 1984.

Tennessee Department of Agriculture, Division of Forestry. Guide to Forestry Best Management Practices. 2003.